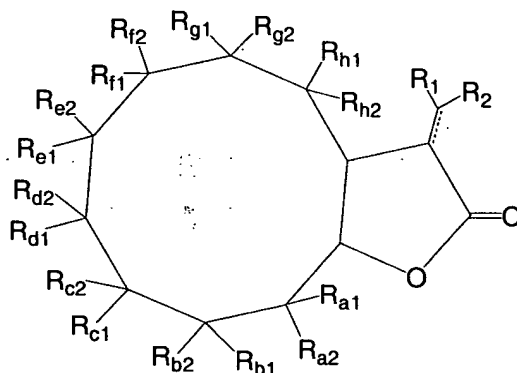


WHAT IS CLAIMED IS:

1. A method for treating hepatitis C virus infection, comprising administering to a subject in need thereof an effective amount of a sesquiterpene lactone having a γ -lactone fused with a 10-membered ring, an 8-membered ring that is further fused with a 4-membered ring, a 7-membered ring that is further fused with a 5-membered ring, or a 6-membered ring that is further fused with a 6-membered ring.
2. The method of claim 1, wherein the γ -lactone is substituted with a methylene group.
3. The method of claim 1, wherein the γ -lactone is substituted with an alkyl group.
4. The method of claim 1, wherein the sesquiterpene lactone is concurrently administered in combination with a second therapeutic agent, in which the second therapeutic agent is IFN α , Intron A, PEG-INTRON, Roferon A, Pegasys, Infergen A, Wellferon, Omniferon, Interferon Omega, Albuferon- α , Rebif, Rebetron, Symmetrel, an NS2-NS3 autoprotease inhibitor, an NS3 protease inhibitor, an NS3 helicase, an NS4 co-factor inhibitor, an NS5B polymerase inhibitor, an IRES Inhibitor, an inosine monophosphate dehydrogenase inhibitor, an E2 inhibitor, an antifibrotic, a caspase inhibitor, a β -tubulin inhibitor, an anti-HCV IgG, an immunosuppressant, or an immune modulator.

5. A method for treating hepatitis C virus infection, comprising administering to a subject in need thereof an effective amount of a sesquiterpene lactone of the formula:



wherein

each of R_1 and R_2 , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, aryl, heteroaryl, aralkyl, an amino acid moiety, a polypeptide moiety, F, Cl, Br, I, OR, SR, NRR' , $C(O)R$, $COOR$, or $O(C)OR$;

--- is a single bond or a double bond;

each of R_{a1} and R_{a2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, $COOR$, or $O(C)OR$; or R_{a1} and R_{a2} , taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{a1} and R_{a2} , together with one of R_{b1} and R_{b2} , is a double bond, $-CH_2-$, or $-O-$; or one of R_{a1} and R_{a2} , together with one of R_{d1} and R_{d2} , is a single bond or $-O-$; or one of R_{a1} and R_{a2} , together with one of R_{e1} and R_{e2} , is a single bond, $-O-CR_2-O-$, or $-O-$; or one of R_{a1} and R_{a2} , together with one of R_{f1} and R_{f2} , is a single bond or $-O-$;

each of R_{b1} and R_{b2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, $COOR$, or $O(C)OR$; or R_{b1} and R_{b2} , taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{b1} and R_{b2} , together with one of R_{c1} and R_{c2} , is a double bond, $-CH_2-$, or $-O-$; or one of R_{b1} and R_{b2} , together with one of R_{e1} and R_{e2} , is a single bond, $-CRR'-CH_2-$, or $-O-$; or one of R_{b1} and R_{b2} , together with one of R_{f1} and R_{f2} , is a single bond or $-O-$; or one of R_{b1} and R_{b2} , together with one of R_{g1} and R_{g2} , is a single bond or $-O-$;

each of R_{c1} and R_{c2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, $COOR$, or $O(C)OR$; or R_{c1} and R_{c2} , taken together, is a

methylene group, a carbonyl group, or an epoxy group; or one of R_{c1} and R_{c2} , together with one of R_{d1} and R_{d2} , is a double bond, $-CH_2-$, or $-O-$; or one of R_{c1} and R_{c2} , together with one of R_{f1} and R_{f2} , is a single bond or $-O-$; or one of R_{c1} and R_{c2} , together with one of R_{g1} and R_{g2} , is a single bond or $-O-$; or one of R_{c1} and R_{c2} , together with one of R_{h1} and R_{h2} , is a single bond or $-O-$;

each of R_{d1} and R_{d2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, COOR, or $O(C)OR$; or R_{d1} and R_{d2} , taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{d1} and R_{d2} , together with one of R_{e1} and R_{e2} , is a double bond, $-CH_2-$, or $-O-$; or one of R_{d1} and R_{d2} , together with one of R_{f1} and R_{f2} , is $-COO-$; or one of R_{d1} and R_{d2} , together with one of R_{g1} and R_{g2} , is a single bond, $-CRR'-CH_2-$, or $-O-$; or one of R_{d1} and R_{d2} , together with one of R_{h1} and R_{h2} , is a single bond or $-O-$;

each of R_{e1} and R_{e2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, COOR, or $O(C)OR$; or R_{e1} and R_{e2} , taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{e1} and R_{e2} , together with one of R_{f1} and R_{f2} , is a double bond, $-CH_2-$, or $-O-$; or one of R_{e1} and R_{e2} , together with one of R_{h1} and R_{h2} , is a single bond or $-O-$;

each of R_{f1} and R_{f2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, COOR, or $O(C)OR$; or R_{f1} and R_{f2} , taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{f1} and R_{f2} , together with one of R_{g1} and R_{g2} , is a double bond, $-CH_2-$, or $-O-$;

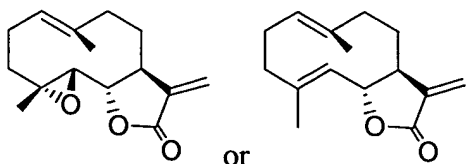
each of R_{g1} and R_{g2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, COOR, or $O(C)OR$; or R_{g1} and R_{g2} , taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{g1} and R_{g2} , together with one of R_{h1} and R_{h2} , is a double bond, $-CH_2-$, or $-O-$; and

each of R_{h1} and R_{h2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, $C(O)R$, COOR, or $O(C)OR$; or R_{h1} and R_{h2} , taken together, is a methylene group, a carbonyl group, or an epoxy group;
in which each of R and R', independently, is H, hydroxy, aryl, alkyl, cycloalkyl, heterocycloalkyl; or R and R', taken together, is a cycloalkyl or heterocycloalkyl.

6. The method of claim 5, wherein each of R_1 and R_2 is H and --- is a double bond.

7. The method of claim 6, wherein each of R_{a1} and R_{a2} , independently, is H; each of R_{b1} and R_{b2} , independently, is H or alkyl; or one of R_{a1} and R_{a2} , together with one of R_{b1} and R_{b2} , is a double bond or -O-; each of R_{c1} and R_{c2} , independently, is H, OR, or O(C)OR; or one of R_{b1} and R_{b2} , together with one of R_{c1} and R_{c2} , is a double bond or -O-; each of R_{d1} and R_{d2} , independently, is H or OR; or one of R_{c1} and R_{c2} , together with one of R_{d1} and R_{d2} , is -O-; each of R_{e1} and R_{e2} , independently, is H or OR; each of R_{f1} and R_{f2} , independently, is H, alkyl, OR, COOR, or O(C)OR; or R_{f1} and R_{f2} , taken together, is a methylene group; or one of R_{e1} and R_{e2} , together with one of R_{f1} and R_{f2} , is a double bond or -O-; each of R_{g1} and R_{g2} , independently, is H, OR, O(C)OR; or R_{g1} and R_{g2} , taken together, is a carbonyl group; or one of R_{f1} and R_{f2} , together with one of R_{g1} and R_{g2} , is a double bond; and each of R_{h1} and R_{h2} , independently, is H, OR, or O(C)OR.

8. The method of claim 7, wherein the sesquiterpene lactone is

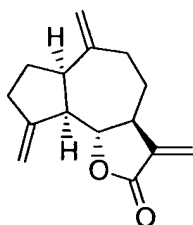


9. The method of claim 6, wherein one of R_{a1} and R_{a2} , together with one of R_{e1} and R_{e2} , is a single bond.

10. The method of claim 9, wherein the other of R_{a1} and R_{a2} is H or alkyl; each of R_{b1} and R_{b2} , independently, is alkyl; or R_{b1} and R_{b2} , taken together, is a methylene group or a carbonyl group; each of R_{c1} and R_{c2} , independently, is H or OR; or one of R_{b1} and R_{b2} , together with one of R_{c1} and R_{c2} , is a double bond; each of R_{d1} and R_{d2} , independently, is H; or R_{d1} and R_{d2} , taken together, is a carbonyl group; or one of R_{c1} and R_{c2} , together with one of R_{d1} and R_{d2} , is a double bond; the other of R_{e1} and R_{e2} is H; each of R_{f1} and R_{f2} , independently, is H or alkyl; or R_{f1} and R_{f2} , taken together, is a

methylene group; each of R_{g1} and R_{g2} , independently, is H; and each of R_{h1} and R_{h2} , independently, is H or $O(C)OR$.

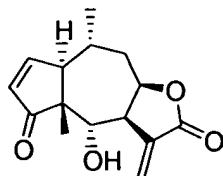
11. The method of claim 10, wherein the sesquiterpene lactone is



12. The method of claim 6, wherein one of R_{c1} and R_{c2} , together with one of R_{g1} and R_{g2} , is a single bond.

13. The method of claim 12, wherein each of R_{a1} and R_{a2} , independently, is H; each of R_{b1} and R_{b2} , independently, is H or alkyl; the other of R_{c1} and R_{c2} is H; or one of R_{b1} and R_{b2} , together with the other of R_{c1} and R_{c2} , is a double bond; each of R_{d1} and R_{d2} , independently, is H or OR; each of R_{e1} and R_{e2} , independently, is H or OR; or one of R_{d1} and R_{d2} , together with one of R_{e1} and R_{e2} , is a double bond; each of R_{f1} and R_{f2} , independently, is H, alkyl, or OR; or R_{f1} and R_{f2} , taken together, is a carbonyl group; the other of R_{g1} and R_{g2} is H or alkyl; and each of R_{h1} and R_{h2} , independently, is H, OR, or $O(C)OR$.

14. The method of claim 13, wherein the sesquiterpene lactone is



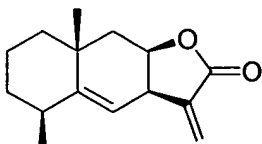
15. The method of claim 6, wherein one of R_{a1} and R_{a2} , together with one of R_{f1} and R_{f2} , is a single bond.

16. The method of claim 15, wherein the other of R_{a1} and R_{a2} is H; each of R_{b1} and R_{b2} , independently, is H or alkyl; or R_{b1} and R_{b2} , taken together, is a methylene group; each of R_{c1} and R_{c2} , independently, is H; or R_{c1} and R_{c2} , taken together, is a carbonyl group; or one of R_{b1} and R_{b2} , together with one of R_{c1} and R_{c2} , is a double bond; each of R_{d1} and R_{d2} , independently, is H; each of R_{e1} and R_{e2} , independently, is H or OR; or one of R_{d1} and R_{d2} , together with one of R_{e1} and R_{e2} , is a double bond; the other of R_{f1} and R_{f2} is alkyl; each of R_{g1} and R_{g2} , independently, is H; and each of R_{h1} and R_{h2} , independently, is H or O(C)OR.

17. The method of claim 6, wherein one or R_{b1} and R_{b2} , together with one of R_{g1} and R_{g2} , is a single bond.

18. The method of claim 17, wherein each of R_{a1} and R_{a2} , independently, is H; the other of R_{b1} and R_{b2} is alkyl; each of R_{c1} and R_{c2} , independently, is H or OR; each of R_{d1} and R_{d2} , independently, is H; or one of R_{c1} and R_{c2} , together with one of R_{d1} and R_{d2} , is a double bond; each of R_{e1} and R_{e2} , independently, is H; or R_{e1} and R_{e2} , taken together, is a carbonyl group; each of R_{f1} and R_{f2} , independently, is H or alkyl; or R_{f1} and R_{f2} , taken together, is a methylene group; the other of R_{g1} and R_{g2} is H or OR; and each of R_{h1} and R_{h2} , independently, is H; or the other of R_{g1} and R_{g2} , together with one of R_{h1} and R_{h2} , is a double bond.

19. The method of claim 18, wherein the sesquiterpene lactone is



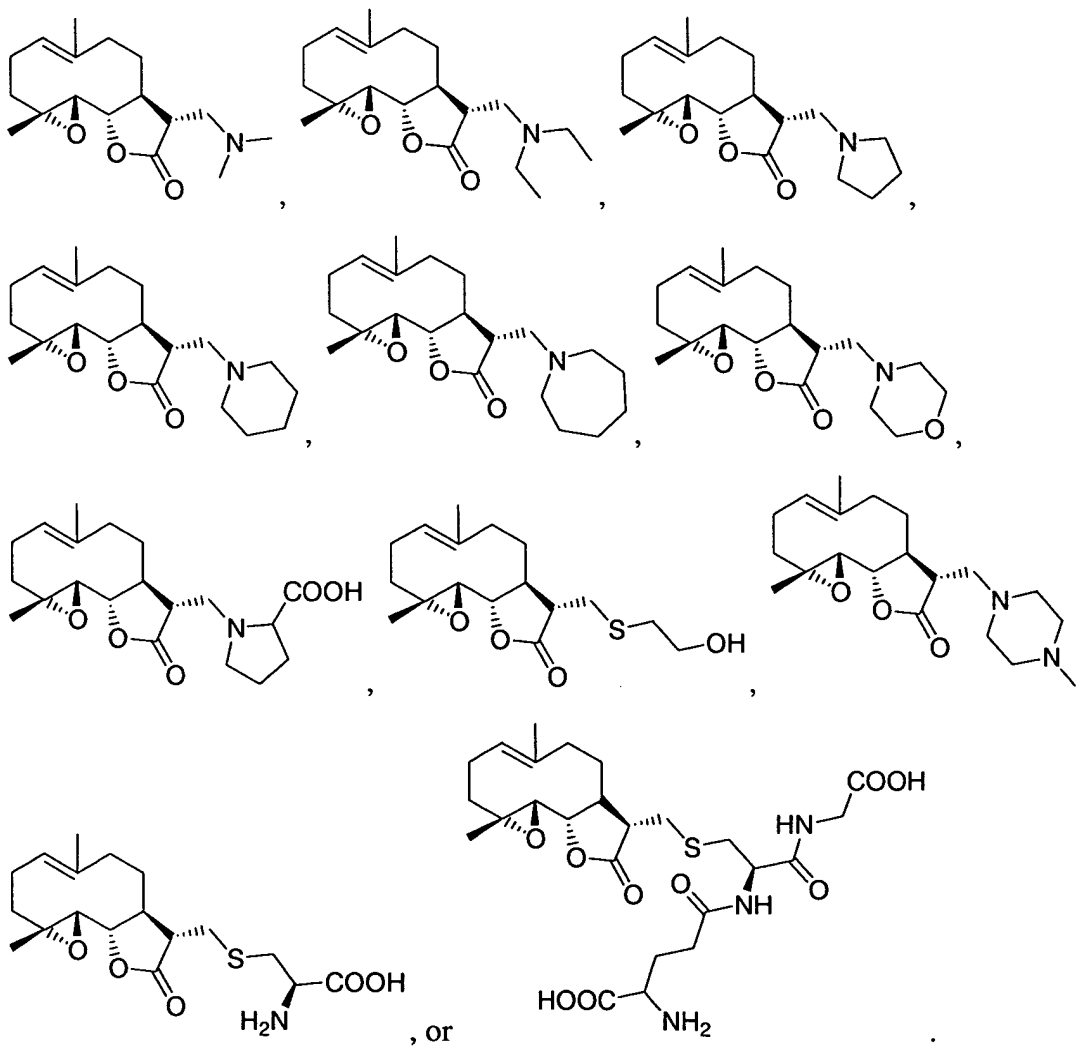
20. The method of claim 5, wherein --- is a single bond.

21. The method of claim 20, wherein each of R_1 and R_2 , independently, is H, heterocycloalkyl, SR, or NRR'.

22. The method of claim 21, wherein one of R_{a1} and R_{a2} , together with one of R_{b1} and R_{b2} , is -O-.

23. The method of claim 22, wherein one of R_{e1} and R_{e2} , together with one of R_{f1} and R_{f2} , is a double bond.

24. The method of claim 23, wherein the sesquiterpene lactone is

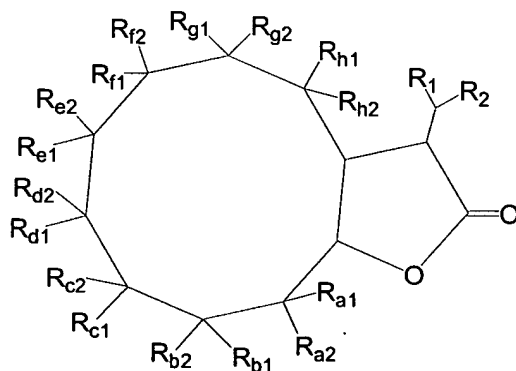


25. The method of claim 20, wherein one of R_{a1} and R_{a2} , together with one of R_{f1} and R_{f2} , is a single bond.

26. The method of claim 25, wherein the other of R_{a1} and R_{a2} , together with one of R_{b1} and R_{b2} , is a double bond or -O-; the other of R_{b1} and R_{b2} is H or alkyl; R_{c1} and R_{c2} , taken together, is a carbonyl group; one of R_{d1} and R_{d2} is H; the other of R_{d1} and R_{d2} , together with one of R_{e1} and R_{e2} , is a double bond or -O-; the other of R_{e1} and R_{e2} is H; the other of R_{f1} and R_{f2} is alkyl; each of R_{g1} and R_{g2} , independently, is H; and each of R_{h1} and R_{h2} , independently, is H.

27. The method of claim 5, wherein the sesquiterpene lactone is concurrently administered in combination with a second therapeutic agent, in which the second therapeutic agent is IFN α , Intron A, PEG-INTRON, Roferon A, Pegasys, Infergen A, Wellferon, Omniferon, Interferon Omega, Albuferon- α , Rebif, Rebetrone, Symmetrel, an NS2-NS3 autoprotease inhibitor, an NS3 protease inhibitor, an NS3 helicase, an NS4 co-factor inhibitor, an NS5B polymerase inhibitor, an IRES Inhibitor, an inosine monophosphate dehydrogenase inhibitor, an E2 inhibitor, an antifibrotic, a caspase inhibitor, a β -tubulin inhibitor, an anti-HCV IgG, an immunosuppressant, or an immune modulator.

28. A sesquiterpene lactone of the formula:



wherein

each of R_1 and R_2 , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, aryl, heteroaryl, aralkyl, an amino acid moiety, a polypeptide moiety, F, Cl, Br, I, OR, SR, NRR', C(O)R, COOR, or O(C)OR;

each of R_{a1} and R_{a2} , independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{a1} and R_{a2} , taken together, is a

methylene group, a carbonyl group, or an epoxy group; or one of R_{a1} and R_{a2}, together with one of R_{b1} and R_{b2}, is a double bond, -CH₂-, or -O-;

each of R_{b1} and R_{b2}, independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{b1} and R_{b2}, taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{b1} and R_{b2}, together with one of R_{c1} and R_{c2}, is a double bond, -CH₂-, or -O-;

each of R_{c1} and R_{c2}, independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{c1} and R_{c2}, taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{c1} and R_{c2}, together with one of R_{d1} and R_{d2}, is a double bond, -CH₂-, or -O-;

each of R_{d1} and R_{d2}, independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{d1} and R_{d2}, taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{d1} and R_{d2}, together with one of R_{e1} and R_{e2}, is a double bond, -CH₂-, or -O-;

each of R_{e1} and R_{e2}, independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{e1} and R_{e2}, taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{e1} and R_{e2}, together with one of R_{f1} and R_{f2}, is a double bond, -CH₂-, or -O-;

each of R_{f1} and R_{f2}, independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{f1} and R_{f2}, taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{f1} and R_{f2}, together with one of R_{g1} and R_{g2}, is a double bond, -CH₂-, or -O-;

each of R_{g1} and R_{g2}, independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{g1} and R_{g2}, taken together, is a methylene group, a carbonyl group, or an epoxy group; or one of R_{g1} and R_{g2}, together with one of R_{h1} and R_{h2}, is a double bond, -CH₂-, or -O-; and

each of R_{h1} and R_{h2}, independently, is H, alkyl, cycloalkyl, heterocycloalkyl, F, Cl, Br, I, OR, SR, C(O)R, COOR, or O(C)OR; or R_{h1} and R_{h2}, taken together, is a methylene group, a carbonyl group, or an epoxy group;

in which each of R and R', independently, is H, hydroxy, aryl, alkyl, cycloalkyl, heterocycloalkyl; or R and R', taken together, is a cycloalkyl or heterocycloalkyl.

29. The sesquiterpene lactone of claim 28, wherein each of R_1 and R_2 , independently, is H, heterocycloalkyl, SR, or NRR' .

30. The sesquiterpene lactone of claim 29, wherein one of R_{a1} and R_{a2} , together with one of R_{b1} and R_{b2} , is -O-.

31. The sesquiterpene lactone of claim 30, wherein one of R_{e1} and R_{e2} , together with one of R_{f1} and R_{f2} , is a double bond.

32. The sesquiterpene lactone of claim 31, wherein the sesquiterpene lactone

